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Prophylactic removal of asymptomatic third molars: A review

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Abstract

Mandibular and maxillary third molars are mostly consigned to 'waste bins' in dental practices because they are terminal in developmental timing and positioning in the dental arches, and regarded as functionally non-essential. Thus, many dental practitioners do not attach significance to the presence of third molars when making therapeutic recommendations to patients about preservation of the dentition. The need for taking more a serious account of third molars is reviewed in this paper.

Key words: Third molars, clinical status, prophylactic removal.

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Introduction

In former times, one criterion for judging the worth of a dentist was his/her ability to remove third molars efficiently and with minimal patient discomfort. This is still important in clinical practice, although questions are now raised more frequently about the need for removal of third molars, especially 'prophylactic removal of asymptomatic molars'.[1-3] There is significantly more thinking about clinical management required collectively among the dental profession, than has been employed up to the present, in order to effectively deal with problems posed by mandibular and maxillary third molars.[4]

The 'asymptomatic' third molar

'Asymptomatic' should infer that the patient has not voiced pain or discomfort possibly attributable to the molar; but is this what a clinician means when using such a description? Alling *et al.*[5] try to overcome a semantic uncertainty by using the description, 'asymptomatic damage', recognizing that a patient may have no 'complaint', that is, be 'asymptomatic', but there can be clinical or radiographic signs of pathosis associated with a third molar. Thus, 'asymptomatic' does not mean 'risk-free', which may only be used to describe the not-so-common condition of a third molar which has erupted in satisfactory functional occlusion without periodontal pathosis, or remained deeply embedded without signs of pathosis or eruptive movement over an extended period of time.

'Prophylactic removal'

'Prophylactic removal' has been advocated as a means to:

1. Prevent the late development or exacerbation of mandibular incisor crowding arguably attributable to the eruptive forces of third molars.[6,7]
2. Avoid the risks of pathological sequelae expected with the presence of partially erupted or impacted third molars.[2,8-13]

Commonly, mandibular third molars are scheduled for removal for the above reasons. This is likely to require the simultaneous sacrifice of maxillary third molars for the prophylactic benefit of avoiding problems resulting from the unopposed eruption of the latter teeth.

Predictability concerning third molars

Predictability is inferred when considering prophylaxis. This requires as objective an assessment as possible of the benefits versus the costs and present or future risks to be expected in 'doing something', or 'doing nothing', or what has been termed 'neglect'.[1,14,15]

As a first step, most such assessments employ estimation of space available for satisfactory eruption of the third molar combined with angular measurement of the displacement of the long axis of the tooth from the desirable inclination prior to, and during, eruption. Cephalometric lateral radiographs have been used for such estimation,[3,16,17] but also have been criticized as being less satisfactory than rotational panoramic radiographs, or right and left angulated cephalometric radiographs.[6,16,18]

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The image of the anterior border of the mandibular ramus is most commonly used as a reference.[6,16,17,19] However, the line of the ramus need not set the posterior limit of space for the molar to erupt because the alveolar process extends to the posterior on the lingual side of the ramus beyond its anterior border.[6,17,18,20] Thus, it has been suggested that a postero-anterior cephalometric radiograph can be used to check arch width related to bilateral ramus width, and then compared with antero-posterior space available for the third molar.[18]

Whilst significant correlations have been reported relating primary positions of developing third molars to their ultimate eruptive status, it seems impossible to predict with any certainty the final position which an individual third molar will take.[6,13]

One other relevant observation is that primary crowding in the anterior part of the dental arch is an indicator of an overall crowding problem of a dental arch, thus giving early warning of insufficient space for third molars to erupt.[13,21]

Costs and risks

If the clinician is satisfied that a particular third molar is truly asymptomatic, then it is justifiable to seriously question its removal from the point of view of assessing direct and indirect (opportunity) costs.[1,22,23] The accounting of such financial costs, as well as health risks, has caused questions to be asked about the continuing wholesale 'slaughter' of third molars.

There are two sets of health risks when considering the fate of third molars:

1. Morbidity associated with their removal.
2. Morbidity associated with retaining third molars, if not 'neglecting' them.

Morbidity associated with removal of third molars

1. Discomfort for the patient.[5]
2. Local soft tissue and bone infection.[5,10,11,22]
3. Loss of tuberosity bone supporting the distal of the maxillary second molar. This is of sufficient concern to cause recommendations about prevention of such an outcome. If, during extraction, it is perceived by the surgeon that tuberosity bone is also breaking away, then it is recommended to cease the procedure and to replace the tooth (if free of pathosis) with its bone support, wait for a period of healing, and then to remove the molar surgically, to minimize loss of bone.[5,11,23-25]
4. Delayed and defective healing, particularly with older patients, such as comparing 20-year-olds with patients of 30 and more years.[5,8-12,22-27]
5. Inability to correct periodontal pocketing at the distal aspect of the second molar which develops if the mesial aspect of an erupting third molar remains partly erupted and exposed to oral fluids.[10,12]
6. Loss of the mandibular molar into the posterior sublingual space if the supporting lingual bony plate is lost during attempted removal.[2,5,11,25]
7. Exposure of the maxillary sinus, or loss of the maxillary third molar into the sinus, during its attempted removal.[11,25]
8. Loss of the maxillary molar into the infra-temporal or pterygopalatine space.[11,22,25]
9. Haemorrhage.[5,22,25]
10. Short- or long-term dysaesthesia affecting the inferior alveolar nerve.[5,11,22,25,26]
11. Temporomandibular (TMD) and/or angular cheilitis resulting from strain of excessive oral opening for operative access, particularly during removal of the maxillary molar.[3,26]

Morbidity in retaining third molars

1. Orthodontic concerns about late development of dental arch crowding attributed to eruptive force of third molars.[5-7,13]
2. Pericoronitis with attendant symptoms.[5,9,11,14,22,25]
3. Periodontal pocketing affecting the bone and posterior surface of the distal root of the second permanent molar associated with mesial impaction of the third molar.[8-10,14,15,26-28]
4. Root resorption at the distal aspect of the second molar associated with third molar impaction.[11,22-24]
5. Other less common conditions including cysts, tumours, cellulitis and temporomandibular joint dysfunction.[5,11,15,25]

These morbidities involve the mandibular third molar more than the maxillary third molar. In comparing morbidities resulting from retention and removal, it might be concluded that there are too many risks to justify the removal of asymptomatic third molars.

However, there are two sets of serious problems involving 'neglect' of what may or may not be,for the patient, 'asymptomatic' third molars:[8-15,22,24-28]

1. Ignoring, or failing to recognize, the frequently deep periodontal pocketing on the distal surface of the mandibular second molar in the presence of a partly erupted third molar.
2. The adverse periodontal consequences for the distal surface of the maxillary second molar if tuberosity bone is lost as a result of removal of the third molar. It should be noted that there is either a total or partial separation of the roots at the distal aspect of the maxillary second molar,[20] which will create conditions for a periodontal furcation involvement, as well as dental caries, where access for oral

hygiene is also difficult.

Oral surgery

The 1979 National Institutes of Health Consensus Development Conference for Removal of Third Molars, cited by several authors,[1,11,13,22,28,29] advised the need for more research on the nature of the 'third molar problem' in order to better define criteria for appropriate clinical decision-making. This heightened the interest of oral surgeons, periodontists, and some orthodontists.

Oral surgeons appeared to be concerned about developing surgical techniques to minimize morbidity resulting from removal of third molars.[5,11,24,25,27] Some surgeons advised caution about removal of asymptomatic third molars.[2,15,22] No doubt surgeons, like most orthodontists, are sensitive to criticisms of a non-conservative approach to oral care. However, they also agree with periodontists in trying to avoid or minimize periodontal morbidity associated with the retention of impacted third molars, as distinct from embedded teeth. Most surgeons also agree that there is likely to be less morbidity associated with the removal of impacted third molars among younger patients compared with the responses of older patients.[5,11,22,25]

The surgeons Alling *et al.*[5] must have considered it important enough to cite an observation of Goodsell: 'More second molars are lost due to third molars being left in place than any other single reason. This includes unerupted and erupted wisdom (third molar) teeth.'

Periodontics

A few periodontics texts[8,9,14] specifically refer to periodontal morbidity affecting second molars in the presence of ectopic third molars.

Periodontitis affecting the distal aspect of the mandibular second molar related to an impacted third molar is noted only in one illustration with passing comment in Glickman's 6th edition.[30] The 7th edition of the same text[31] omits that illustration and comment.

It can be difficult to tell whether or not pericoronitis is part of the periodontal problem of third molars when it is given only cursory comment in some texts.[30,32]

Recently, more reports of periodontal morbidity relating to third molars have appeared.[10,12,27-28] Their general conclusions from both retrospective and prospective clinical observations are that impacted third molars represent a serious periodontal 'hazard' which cannot be overcome by the usual procedures for pocket eradication and delay in removal of impacted third molars beyond 25-30 years of age is detrimental to the periodontal health of the second molars.

Thus, prophylactic removal of mandibular third molars seems to be generally favoured among modern periodontists. However, it is surprising that there is little reference to any special periodontal problem affecting maxillary second molars, such as the frequently occurring and inaccessible root furcation at the distal aspect of that tooth, which is made vulnerable to root caries and periodontal pocketing whenever the third molar is removed with its supporting tuberosity bone. Perhaps this adds more substance to Goodsell's observation.[5]

Orthodontics

Orthodontists seem totally concerned with trying to solve the age-old question about whether or not the eruptive force of third molars contributes to, or is largely responsible for, late development of mandibular incisor crowding. The majority of reported clinical assessments have found no positive association between crowding and presence of third molars, whether or not there have been previous premolar extractions, but they still cannot totally rule it out.[17,33,34] There are some which have come to an opposite conclusion,[6,35] and those which also allow that the crowding problem may be 'multi-factorial' in origin, and that the third molar can be influential in individual cases.[3,13,17,21,33,35] Bjork and Skieller[36] seemed inconsistent in saying: 'More probably the shortening of the arches is to some extent due to the pressure exerted by the erupting second molars. The part played by the third molars in this connection, however, cannot be judged reliable until completion of jaw growth and root development.'

In a clinical trial with adolescents, observing the effects on arch crowding subsequent to unilateral removal of mandibular third molars, Lindquist and Thilander[16] concluded that 'the space change on the extraction side was improved in relation to the control side in 70 per cent of the cases, (so that) extraction could be recommended in severe crowding'. Such a conclusion cannot be compared with what might be observed in cases of congenital absence of third molars, despite views to the contrary.[17,34] Congenital absence means absence for the total period of jaw and dentition development, not removal towards the end of such development. The two sets of conditions are not comparable.

Morbidity, and particularly periodontal morbidity relating to third molars and under discussion here, does not seem to be featured in most of the current orthodontic publications. If there is any mention, it is solely related to the 'infamous' mandibular third molar. Proffit[35] asserts that 'in most individuals, these teeth are hopelessly impacted, because jaw length did not increase enough to accommodate them via backward remodelling of the ramus'. Proffit's implication is that the mandibular third molar can or should be written off as a useful tooth.

An equivalent fate for the maxillary third molar is not considered. Incidentally, on the same page, he shows a lateral jaw radiograph of an impacted mandibular third molar, but with no reference to what may be an infrabony pocket at the distal end of the second molar.

It is difficult to find data on the incidence of third molar impactions and morbidity. Grover and Lorton[37] found 'high incidence' among young adult males, even though no account could be taken of congenital absence or prior removal. Whether or not all modern population groups have similar experiences is not known.

There is also a question about 'non-extraction therapy'. Does such therapy involve keeping third molars or not? Alexander,[38] an internationally recognized orthodontic authority, reviews his post-treatment orthodontic retention routine and, while noting that he treats 75 per cent of his patients 'non-extraction' (presumably, that is, without premolar extractions), still finds it necessary to deliver his patients' third molars into the hands of his oral surgeon colleague, who then carries responsibility for the decision about their removal. Like most orthodontists,Alexander does not refer to the nature of the possible morbidity associated with the molars and which is not ordinarily taken into account in initial diagnosis and treatment planning. So, is 'non-extraction therapy' largely an orthodontic myth, or is it a misrepresentation of what is required to correct the clinical problem; and are third molars simply non-accountable?[39] Despite claims to the contrary by Ricketts and others,[3,40] it is valid to argue that early predictions of third molar behaviour to justify enucleation of third molars are virtually impossible; and 'enucleation' also cannot satisfy the claims of any 'non-extractionist'.

Some orthodontists view impacted third molars in relation to possible discomfort which their patients may suffer before or following the removal of these teeth, if not in relation to their 'closet belief' that third molars are a source of late crowding. Such orthodontists ask the question: 'Can these third molar problems be avoided by creating additional space with extraction therapy, removing teeth at some position anterior to the third molars?'Thus, as an alternative to premolars, extraction of second molars has been advocated because of the extra space which they vacate, even though they may be inconveniently far from the malocclusion problem, such as crowded or proclined incisors.[7,39,41] Even though sufficient space may be available for third molar eruption after extraction of second molars, there is no certainty that the tooth will erupt as desired.

Four problems are common with third molar eruption following extraction of second molars:[42]

1. The long axes of most erupted third molars will be more or less displaced from what is desirable.
2. The maxillary third molar is likely to erupt before the mandibular third molar, if all second molars are extracted simultaneously. The effect is then for the third molar to extrude beyond the desired occlusal level.
3. Because of the changed axial inclinations, as well as non-synchrony of eruption of both third molars, there will be differences in heights of proximal marginal ridge relationships of the first and third molars.
4. Proximal spacing between first and third molars which is likely to become a food impaction site.

Thurow[7] referred to some of the possible extraction options, going from first premolars to second molars and third molars. However, premolar extractions alone, while helpful in the correction of many malocclusions,are often found wanting in enabling a sufficient residue of space to allow third molars to erupt into good positions.

The separate and unique problems affecting the mandibular and maxillary third molars which have been reviewed suggest that these teeth might not both be treated in the same way. Thus, there have been suggestions to extract maxillary second molars and remove mandibular third molars,[3,43] although there are contrary observations[44] that such a clinical strategy does not automatically produce good relationship of the maxillary third molar with the distal aspect of the maxillary first molar, or with the occluding mandibular second molar.

Of course, all of these alternatives to prophylactic removal of third molars are considered on the basis that both maxillary and mandibular third molars are of suitable morphology, size and position, so far as can be determined radiographically.

Conclusions

There is likely to be continuing disagreement over which clinical recommendation to make when considering 'prophylactic removal of asymptomatic third molars'. Nevertheless, the following conclusions are offered:

1. Both maxillary and mandibular second molars are vulnerable to pathological sequelae when malpositioned third molars are left *in situ*, or following removal of third molars.
2. Whenever clinical evaluation produces an uncertain prognosis for mandibular third molars, it is preferable to remove them during or immediately following adolescence, when prospects for sound healing are at their best.
3. Extreme care, amounting to surgical removal rather than extraction, is required for both mandibular and maxillary third molars.

4. An alternative to maxillary third molar removal may be the extraction of the maxillary second molar, with the proviso of following up by intentionally establishing good proximal contact of the maxillary third molar with the maxillary first molar and good occlusal relationship with the mandibular second molar.

5. If third molars are retained and allowed to erupt, in most cases their early orthodontic repositioning will be desirable, if not essential.

6. The status of third molars, including the possible need to predict their future healthy viability, is an essential component of orthodontic diagnosis to be applied in initial orthodontic treatment planning and ongoing orthodontic supervision for adolescent patients.

7. Patients must be given advice concerning the present and possible future status of their third molars.

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